A Visit With ICOM

A Success Story in Amateur Radio

BY BRAD FIELD, JR., W8JJO

American Amateurs have, in the last year, noticed the introduction of all-band, high-frequency gear by ICOM, Incorporated. Many hams who never operate on the vhf bands seem to think that ICOM is a new company. Others, who have been working through two-meter repeaters for years, are well acquainted with ICOM two-meter fm gear. There is also a mistaken impression that the company is part of some vast Japanese conglomerate.

ICOM is, in fact, not a large outfit, but rather a medium-sized one. It started making ham gear over twenty years ago, specializing in ham gear almost exclusively.

The factory is in Osaka, and I stopped there for a visit in the spring of 1978. The photos show some of the interesting sights and people. ICOM had just moved into the third of its present three buildings. All are within sight of each other in the industrial southeast corner of Osaka. The buildings are of similar construction; four stories, no elevators, reinforced concrete, and designed — like all buildings in Japan — to withstand the shock of a heavy earthquake. One of the buildings is devoted to production; another to sales, shipping, and service within Japan; and the main building contains the finance and personnel sections, as well as some shipping and packing, production lines, and a section devoted to research and development.

Quick and nimble fingers wiring up sub-assemblies on a production line at the ICOM factory. **Inset:** Some of the test gear is homebrewed, like this one designed to test front-panel wiring on the IC-701 transceivers. The rubber elastic strap around the edge of the panel protects it from scratches.

About 230 people work in these three buildings. There are, in addition, five other production lines run by subcontractors who each put together a single piece of ICOM gear. There the circuit boards are stuffed with parts. Then they are dip-soldered, the leads clipped, flow-soldered, and put through a coarse, "ball-park" tuning process, before they are sent back to ICOM for testing, final assembly, and testing again.

A beginning

ICOM was not always this big. I had a chance to talk with its president and founder, Tokuzo Inoue, JA3FA. He

traced the company's beginning back to the days, twenty-five years ago, when he was himself a sub-contractor, making electronic sub-assemblies for a manufacturer of electro-cardiograph equipment. On the side, he began building up a rig for sale — a six-meter a-m portable. That went well enough to encourage him to specialize in the manufacture of ham gear exclusively, which the company has been doing ever since. He began in 1957 with ten employees, and fifteen years ago they incorporated, slowly growing to the company's present size.

It is still growing; sometimes the process shows at the factory in Osaka. The president's office has the usual big desk, but it also has carboard boxes stacked in corners. In older companies there is a place for everything, and everything in its place, but a growing company like ICOM seldom has time for that. Things change fast enough that the temporary place to stack something may be the most permanent location that it ever gets. Growth

Tokuzo Inoue, JA3FA, president and founder of ICOM Incorporated, in his office in Osaka.

shows downstairs too, in the parts and purchasing section. I was told that it was due for an expansion of space soon, and it looked it. People were standing in each other's pockets. However, the Japanese are adept at moving in close quarters, indeed, quite comfortable in them. I seemed to be the only one there bothered by the crowding. Later, I was shown the top story of another building, a floor half empty — waiting for a manufacturing section to move up there.

The ICOM factory is located in the southeastern industrial area of Osaka. When asked about the smog, company founder and president Tokuzo Inoue, JA3FA, says, shrugging, "Oh, well, it's no worse than Los Angeles."

Growth is also reflected in the "historical collection" of the models that ICOM has made in the past. It is not in glass cases, but stacked up helter-skelter on some shelves in a corner, waiting for the day when someone can find the time to organize it into a display.

Some of this growth came over a relatively short period, thanks, Mr. Inoue modestly claims, to a lucky accident. The company at first had tried to make a little of every kind of ham gear, though it also invested its attention heavily in research and development. The company once produced a five-band high frequency ssb/CW transmitter and receiver pair, the IC-700T and IC-700R, over ten years ago. Mr. Inoue now shrugs off its sales as "not a big success," because he sold only about two thousand units. This led him to decide to concentrate, for a few years at least, on vhf gear.

At about the same time, in 1966, the Japan Amateur Radio League (JARL) entered into an agreement with the Japanese postal and telegraph authorities, the controlling agency for Amateur Radio in Japan. JARL agreed to assume the responsibility for administering the test for Japanese Amateur licenses, and then began to organize classes in Amateur Radio theory and code. The result was a sudden boom in the number of Japanese Amateur operators.

The Novice license in Japan can be renewed indefinitely. The most popular type is a phone-only, ten-watt license. It's not easy to work DX with such a restriction but it's fine for local rag-chewing. However, the high frequency bands in that part of the world are narrow, crowded, and beset by a multitude of intruding non-Amateur signals. Repeaters have never been legal under Japanese radio law, but, even so, in 1967 there was a rush to the market for vhf gear. Inoue

and his associates at ICOM were surprised by the rush, but they were also ready — by luck, Inoue says — to produce

Akio Shimzu, JA3JM, exports manager for ICOM, holds up one of the early and popular two-meter fm rigs manufactured by ICOM; to his right, the "historical bin" of still other older models of high frequency and vhf equipment.

two-meter gear of high quality and in some quantity. Thus ICOM participated in the boom.

Exports

Of course ICOM, then, as now, was manufacturing gear for export markets too. Some of the vhf gear was specifically designed for use with American duplex repeater systems, though a large portion of its new sales at that time was in Japan, for the Japanese simplex-only market.

The requirements for the Japanese and American markets are different enough that it is more practical to design different gear for each, in preference to trying to make one design that will work in either. A simple example is two-meter gear: the American band is four megahertz wide, from 144 to 148, and most American Amateurs buy gear for use with fm repeaters and duplex operation above 146 MHz. But gear for Japan has to be designed to work on simplex only, and below 146 MHz, not above it.

Mr. Inoue grimaced as he told how he gets letters now and then from Americans who had, on a trip to Japan, purchased some ICOM two-meter gear. The letters typically complain that when the American got his gear home "it wouldn't work." Inoue sighed, "We try to help people who write us in that situation," he said, "but the equipment is not under guarantee, and it costs a lot of money to rework it for the American band." Then he rubbed his forehead gloomily. Clearly, the problem gave him a pain.

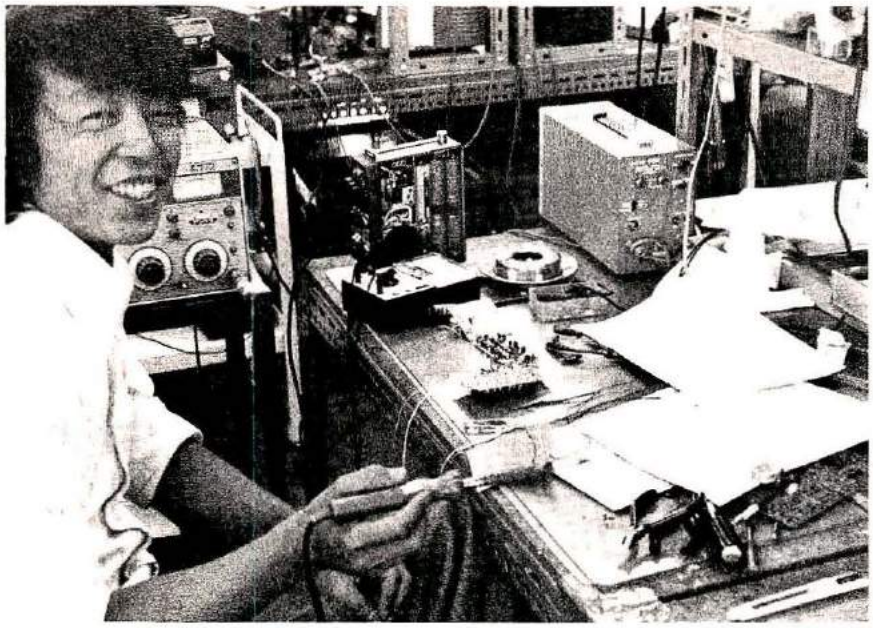
Engineering and research

The ICOM factory has good facilities for custom work, but it is all committed to research and development for future products. There are twelve engineers at ICOM who spend their time at little else; ICOM has always had a large contingent of engineers in development. Mr. Inoue once discussed with Art Collins, the originator of Collins Radio, the question of the best proportions of staffing a company — research versus current production. ICOM then had a research section proportionately as large as it is now. Collins told him that was the only way to go.

That is the way ICOM has gone. The rigs that they market now are the result of development work begun years ago. The digital twin VFO was first projected before 1975 when one ICOM engineer, Kiyoshi Sakurai, JA3FMP, began design work on a transceiver that could be controlled by a remote computer. That meant a rig that had no mechanical linkage to its own front panel, only an electronic one, and that, in turn, meant a digital VFO. He also knew that two VFOs would be, under Amateur operating conditions, a great convenience.

There was no single integrated circuit available with sufficient capacity, so he did some breadboard work with Motorola chips. The size, and the manufacturing cost, of the resultant circuit made it impractical. But, about that time, some manufacturers of CMOS devices announced that they would take orders for custom-designed chips. The engineer transferred his breadboard work to a design pattern for an LSI chip. It took eight pages of paper taped together; he finished with a

ICOM vhf gear on the test bench, receiving the standard checks applied to every piece after assembly.



In the engineering section of ICOM, work is done on a possible design for some future piece of gear.

drawing twelve meters square!

The maker of the chip, Nippon Precision Electronics, a subsidiary of Seiko, the watch manufacturer, then took over for further design work. The drawing was gradually reduced by photography to its present size, 6.3 by 6.1 millimeters. That seems small, but it is, at this writing, the biggest CMOS LSI device in Amateur use. It took about fourteen months of adjustment and modification to get chips that would pass ICOM's tests, and even now sixty chips are rejected for every ten that are accepted.

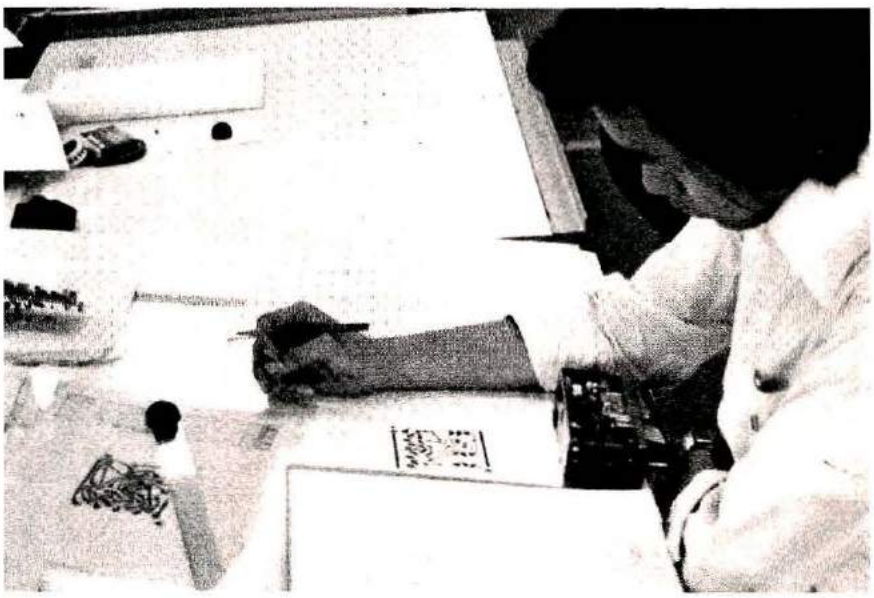
The future of ICOM involves further experimentation with remote control. Both the IC-211 and IC-701, as well as several other ICOM rigs, are controllable by the computerized remote box, the IC-RM2, which has four memories. Three rates of frequency change, simplex or duplex operation, any of 12 standard tones, and any valid Amateur frequency may be programmed, stored, and applied to either of the transceiver's VFOs. Mr. Inoue suggests that much of the equipment that we now habitually expect to see on the operating desk will soon disappear into black boxes tucked away in corners, out of sight, and that the controls may all be contained on a small panel, the size, perhaps, of a typical hand-held calculator.

The future

In the ICOM engineering section I saw some other developments as well; some with computers, some breadboard work, and some last refinement of equipment before it is put into manufacture.

The electronics business is subject to forces beyond the control of the people in it. One such force is the rules changes that sometimes come from various governmental agencies. Another is the sudden boom in new modes of communication, such as the one for ssb that put many American manufacturers on the sidelines in the late 1950s. In *QST* for March, 1978, an editorial threatened us with another such revolution from the "frequency compandor." A third influence is the world economic situation; the nose-dive of the dollar in 1977 and 1978 has markedly increased the effective price of Japanese equipment in the United States. American firms are more and more tempted to get back into the ham market again. But, in the field of high-quality equipment, where the price is not as important as the performance, the small or medium-sized company with a commitment to research and development, like ICOM, is going to be hard to match.

HRH



An ICOM engineer poring thoughtfully over the pattern for a circuit board; under his right elbow, the circuit diagram of the whole rig; close in front of him, the subassembly itself.